MASTER OF PHILOSOPHY (MATERIOBIOLOGY) PROGRAM
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Please refer to the link below for more information on MPhil guidelines
Master of Philosophy (Materiobiology) Program

Background
The research areas of Tissue Engineering, Biofabrication, and Regenerative Medicine is highly related to the use of new and advanced materials in biological applications, and this has led to an emerging field of “Materiobiology”, a recently developed concept in the field of biomaterials interactions with cells and tissues, which recognizes the core role of both biology and materials aiming functional development of new medical materials and devices.

QUT researchers are leaders in this emerging field, with Professor Yin Xiao and Professor Changsheng Liu from the East China University of Science and Technology (ECUST) publishing a seminal paper in this field in 2017 (Li Y, Xiao Y, Liu C., “The Horizon of Materiobiology: A Perspective on Material-Guided Cell Behaviors and Tissue Engineering.”, Chem Rev. 2017 117(5):4376-4421). This paper is currently a highly cited paper (in the top 1%) in the field of Chemistry for 2018 (Source: web of science).

During a visit by QUT’s Vice-Chancellor in November 2017 to ECUST, a mutual understanding was reached to collaborate in the area of Materiobiology, and during 2018, a formal agreement for a QUT Master program (Master of Philosophy, IF80) with a specialization in Materiobiology was developed as a specific collaboration between QUT and ECUST. Thus the value of the emerging discipline and the strength of the partnership with ECUST are recognized. The agreement was signed by both Universities during a visit by the QUT Vice-Chancellor to ECUST in November 2018.

Core Content
The ECUST and QUT collaborate on a QUT Master of Philosophy (Materiobiology) program whereby high-quality students attending ECUST in the fourth year of a Bachelor degree will be selected by ECUST academics to apply for enrolment in QUT’s Master of Philosophy (MPhil) program. If successful, these students will complete the MPhil at QUT’s Brisbane campus for up to twenty-four (24) months of full-time enrolment.

Course Coordinator: Dr Yinghong Zhou
Number of students for the course: 5-10 (for 2020 start)

Course structure
Commencement date: between October and December each year
Orientation weeks: After students start the program, there will be two weeks induction and essential courses conducted by QUT supervisors
Stage 2 report: End of the second month after the enrolment
Progress report: Every two months

Final seminar: After 18 months of the program

Thesis submission and examination: within three months after the final seminar

Graduation: All students will attend the graduation ceremony at the same time

Course contents: Supervisors from QUT SEF and FoH will arrange contents of research

Funding: QUT will provide tuition fee waiver for the students, ECUST students will pay for their own living expenses, and supervisors will provide project funding.

Supervisor Team

The students under the M.Phil. in Materiobiology will be co-supervised between QUT (principal) and ECUST. QUT will have 15 Professors, Associate Professors, and senior researchers who can supervise in this field. Based on the research interest, QUT supervisors (principal) and ECUST supervisors (associate) are tentatively paired, however, as stated, the match of supervisors between QUT and ECUST can be adjusted accordingly to the project and the profile of supervisors listed in the end of the document.

Role for Supervisors from ECUST: Initial student recruitment, pre-entry training of research skills for the selected students, participation of the M. Phil. Program.

<table>
<thead>
<tr>
<th>QUT Supervisors</th>
<th>ECUST Supervisors</th>
<th>Proposed Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prof Yin Xiao</td>
<td>Prof Changsheng Liu, A/Prof Yulin Li</td>
<td>Immunoregulatory nanomaterial development and bone regeneration</td>
</tr>
<tr>
<td>Prof Yuantong Gu</td>
<td>Prof Yuan Yuan</td>
<td>Optimal design for 3D printed scaffold</td>
</tr>
<tr>
<td>Prof Chen Yan</td>
<td>Prof Fangping Chen</td>
<td>Bio-inspired materials for tissue engineering</td>
</tr>
<tr>
<td>Prof Cameron Brown</td>
<td>Prof Runhui Liu</td>
<td>Biomimetic materials for drug delivery</td>
</tr>
<tr>
<td>Prof Zhiyong Li</td>
<td>Prof Fangping Chen</td>
<td>Absorbable haemostatic materials</td>
</tr>
<tr>
<td>Prof Prasad Yarlagadda</td>
<td>Prof Runhui Liu</td>
<td>Designing antimicrobial polymers</td>
</tr>
<tr>
<td>Prof Rik Thompson</td>
<td>Prof Yongsheng Li</td>
<td>Nanohybrids for cancer diagnosis and therapy</td>
</tr>
<tr>
<td>Prof Mia Woodruff</td>
<td>Prof Xue Qu</td>
<td>Electrofabrication of biomacromolecules for medical applications</td>
</tr>
<tr>
<td>A/Prof Travis Klein</td>
<td>Prof Xue Qu</td>
<td>Multi-functional hydrogel scaffolds</td>
</tr>
<tr>
<td>A/Prof Michael Doran</td>
<td>Prof Yongsheng Li</td>
<td>Hybrid scaffolds for osteochondral repair</td>
</tr>
<tr>
<td>A/Prof Larisa Haupt</td>
<td>Prof Jing Wang, Dr Qi Gan</td>
<td>Designing biomaterials for recruiting stem cells and its applications in stem cell therapy</td>
</tr>
</tbody>
</table>
A/Prof Yi-Chin Toh  |  A/Prof Hongyan He  |  Design of low-cost biochip/biosensors
Dr Phong Tran  |  Prof Runhui Liu  |  Developing new strategies for polymer synthesis
Dr Yinghong Zhou  |  Prof Jing Wang, Prof Runhui Liu  |  Hybrid scaffolds with immunoregulatory properties for angiogenesis and osteogenesis
Dr Indira Prasadam  |  A/Prof Dechao Niu  |  Controlled drug delivery and imaging-guided therapies

ECUST supervisors will help with the recruitment of students for the course and conduct some initial research training by working with QUT supervisors.

**Students Recruitment**  
The program provides a specific pathway for highly competent students from ECUST in their final year of bachelor’s studies to apply for enrolment in QUT’s Master of Philosophy (MPhil) program. The students are expected to have an adequate background in the basics of Materials Science, Engineering, and Biology, especially those with specialization in Bioengineering.

Highly competent applicants for the program will be selected based upon joint selection by QUT and ECUST academics. QUT researchers will deliver presentations at ECUST and be involved in student recruitment and interview. ACCTERM and QUT/SEF/FoH International Office will assist with student enrolment.

The joint project and supervisors’ information will be posted on the website for student recruitment.

**Cost and Scholarships**  
QUT will provide tuition fee waiver for the students and ECUST students will pay for their own living expenses.

**Duration**  
The duration of M.Phil. is expected to be within 18 months and a maximum of 24 months. The first students are expected to join QUT in September 2020.

**Coursework, Workshop and Training**  
Students will not undertake any course work at QUT other than the existing unit of IFN001 (Advanced Information Retrieval Skills) where this is units identified as required to build knowledge for individual students.
A series of workshops will be delivered by supervisors from QUT and ECUST to introduce basic information and cutting-edge advances about Materiobiology, mainly focusing on tissue engineering, stem cell technology, regenerative medicine, and biofabrication. It will help students to develop an advanced understanding of Materiobiology that is highly relevant to their research projects. Practical skill workshops including English Writing, Culture Integration, Statistics, Research Ethics and Integrity Workshops will also be provided.

Online training, lab induction and training are mandatory for all students to obtain access to the labs. Basic lab skill training is also available for the students.

Report Requirements

The students are required to write progress report and present progress every two months. The progress report template is attached as Appendix 1. The reports will be reviewed by the supervisor team. The students will receive support and advice to reach certain milestones or course completion, including a timeline breaking down what they need to accomplish. The timeline is attached as Appendix 2.

The students are expected to meet the following milestones within specified timelines:

- **Stage 1** – Application for admission at the beginning;
- **Stage 2** – Preliminary research proposal within the first three months;
- **Confirmation** – The research proposal is confirmed within 12 months;
- **Final Seminar** – Final quality assurance of the thesis is expected in 18 months;
- **Thesis Examination** – The assessment of student’s work against degree requirements is expected within 18-24 months.

ACCTERM Involvement

- ACCTERM will develop a course guideline and structure for the cohort students including the induction, campus tour, orientation week, course teaching, etc.
- ACCTERM will assist with student enrolment, organize student meetings with supervisors.
- All the students within the MPhil program will attend the annual ACCTERM Research Forum.

English Language Requirements

Depending on their previous experience and qualifications, the students may need to meet English language requirements. We accept test results from:

- IELTS (Academic)
TOEFL iBT (Internet-based)
Pearson Test of English (PTE Academic)
Cambridge English: Advanced (CAE)
Cambridge English: Proficiency (CPE)

<table>
<thead>
<tr>
<th>English test</th>
<th>Overall</th>
<th>Listening</th>
<th>Reading</th>
<th>Writing</th>
<th>Speaking</th>
</tr>
</thead>
<tbody>
<tr>
<td>IELTS Academic</td>
<td>6.5</td>
<td>6</td>
<td>6</td>
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<tr>
<td>TOEFL iBT</td>
<td>79</td>
<td>16</td>
<td>16</td>
<td>21</td>
<td>18</td>
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<tr>
<td>Pearson PTE (Academic)</td>
<td>58</td>
<td>50</td>
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<tr>
<td>Cambridge English Advanced (CAE)</td>
<td>176</td>
<td>169</td>
<td>169</td>
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<tr>
<td>Cambridge English Proficiency (CPE) C1</td>
<td>-</td>
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</table>

The students must take their test no more than 2 years before the start of their course.

Visa Application

How to apply

Once the students have accepted the offer, QUT will issue the students with their confirmation of enrolment (CoE) for student visa application.

The student visa can be applied online through the Department of Home Affairs application site. The Department of Home Affairs website provides information on the evidence the students need to support their application.

Visa assessment

The student’s application for a visa will be assessed by the Department of Home Affairs. Find more information about visa assessment processes via the Department of Home Affairs website.

It might take a long time to process your visa, the students are advised to leave plenty of time to apply.

If the application is successful, the students will be offered a four-year visa, but they are expected to complete, their masters in one and a half years or their Ph.D. or professional doctorate in three years.

Bringing family to Australia

If the students are bringing their children to Australia, they must provide evidence that they are making arrangements for their children to attend school while in Australia.

More information about how to get prepared for travelling to Brisbane, adjusting to life in Brisbane, orientation and more students support could be found at this link: https://www.qut.edu.au/study/applying/international-applying-for-degrees/getting-prepared
Appendix 1 - Quarterly Progress Report

Project ID:
Project Title:
M.PHIL. Student:
Supervisor(s):
Administering Org: QUT
Associated Org: ECUST

PROJECT PROGRESS
1. Outline your progress since the last report or milestone, including reference to resources, facilities and equipment and any impediments to your progress.

2. Update your research progress
   - Research aim
   - Methodology
   - Results
   - Discussion

3. Indicate any engagement in Mentoring programs with any Industry Mentor and Academic.

4. Provide details of any professional short courses/workshops attended.

5. Provide details of any national/international lab visits or facilities by staff/students.

6. Number of government, industry and business community briefings

7. Other Associated Projects

OUTPUTS
1. Provide details of any journal articles, books, book chapters or conference publications.

2. Provide details of the quality of Journal publications (peer reviewed etc).

3. Provide details of any Industry reports and publications.

4. Details of research development activities including attending or giving talks, seminars, developing links and collaboration (nationally and internationally)
**FUTURE PLAN**

1. What are your intentions for the next three months? (e.g. continue, lodge thesis, take leave, etc.)

2. What are your research plan for the next three months?
   - *Research aim*
   - *Proposed methodology*
   - *Expected results*

3. Is your research likely to generate commercially sensitive outcomes?

4. Has there been progress with ethical clearance?

5. Any other related issues
## Appendix 2 – Timeline (24 months)

<table>
<thead>
<tr>
<th>Time Elapsed (in years)</th>
<th>1</th>
<th>2</th>
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<tbody>
<tr>
<td>Time Elapsed (in months)</td>
<td>3</td>
<td>6</td>
</tr>
</tbody>
</table>

### Master Milestones
- Stage 2
- Confirmation
- Progress Report
- Final Seminar
- Lodgement

### Coursework
- Advanced Information Retrieval Skills (IFN001)
- Other

### Research Progress
- Literature reviewing & Methodology development
- Project(s)
- Data assessment
- Publications
<table>
<thead>
<tr>
<th><strong>Thesis Writing (by chapter)</strong></th>
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<tr>
<td>Title &amp; Abstract</td>
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<tr>
<td>Introduction</td>
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<tr>
<td>Literature Review</td>
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<tr>
<td>Methodology</td>
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<td>Data Analysis</td>
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<td>Discussion</td>
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<td>Conclusion</td>
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<td><strong>Research activities</strong></td>
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<tr>
<td>Conference</td>
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<tr>
<td>Other</td>
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Appendix 3 – Proposed QUT Supervisors

Professor Yin Xiao
Email: yin.xiao@qut.edu.au
https://staff.qut.edu.au/staff/yin.xiao

Profile
Professor Xiao is currently the Leader of Bone & Joint Diseases Program at Queensland University of Technology (QUT), Australia. He is the founder and the Director of the Australia-China Centre for Tissue Engineering and Regenerative Medicine (ACCTERM) established in 2013. ACCTERM is a multi-institutional and multidisciplinary joint research centre, which supports enhanced knowledge exchange, collaborative postgraduate training and the development of new collaborative research initiatives. ACCTERM draws together new and longstanding research collaborations and aids in creating a highly visible hub for clinical translation in this field.
Professor Xiao’s work has predominantly focused on the fields of bone biology, biomaterials, stem cells, dentistry, osteoarthritis, and tissue engineering and regenerative. He has published three edited books, more than 18 invited book chapters and 255 journal papers. Professor Xiao’s work has been cited widely for more than 9000 times and his H-index has reached 57 (Google scholar). He is pioneered in the development of immune-regulatory biomaterials and osteoimmunology in the research of bone biomaterials.

Research Project / Interest

- Immunoregulation in bone biomaterial development and bone regeneration
- Microenvironment for stem cell differentiation and biomaterials optimization
- Technologies for Endogenous tissue regeneration
- Clinical translation of regenerative medicine
**Profile**

Professor YuanTong Gu is Acting Head of School of School of Chemistry, Physics and Mechanical Engineering and a prestigious ARC Future Fellow at Queensland University of Technology. He is a world-renowned expert in computational mechanics and biomechanics. He has secured around $10M research fund including 14 ARC research grants. He authored more than 280 refereed journal publications and one academic book. Most of his publications are in highly ranked journals including Nature Communications, JACS, AFM, Nano Letters. He was Editor-in-Chief for Australian Journal of Mechanical Engineering, and is Associate Editor for two prestigious international journals, and an Editorial Board Member for other five journals. He is now the vice president of International Chinese Association for Computational Mechanics. Prof Gu is leading The Laboratory for Advanced Modelling and Simulations in Engineering and Science (LAMSES) in QUT, which is one of the largest Australian research groups on computational mechanics including around 30 researchers and PhD students. Total 32 PhD graduated under Prof Gu’s supervision.

**Research Project / Interest**

- Experimental and numerical investigation of biomechanics properties of shoulder cartilage (ARC Discovery Project)
- Advanced computer modelling deformability and morphology of red blood cells under different ages (ARC Linkage Project)
- Optimal design for 3D printed scaffold and stent (Proposed ARC DECRA project)
- Investigation on cellular uptake of nanoparticles
Professor Cheng Yan
Email: c2.yan@qut.edu.au
http://staff.qut.edu.au/staff/c2.yan

**Profile**

Cheng Yan is a professor in the School of Chemistry, Physics and Mechanical Engineering, and the domain leader of Metals, Rocks and Inorganic Materials of the Institute for Future Environment, Queensland University of Technology, Australia. His main research interest is synthesis and characterization of nanocomposites, biomedical and energy materials. He has generated more than 200 international journal papers and received A $8 million research funds, including 16 Australian Research Council (ARC) grants. He was awarded several competitive fellowships from ARC (Australian Postdoctoral Fellow and Australian Research Fellow), University of Sydney (Sesqui Fellow) and Queensland Government (Inaugural International Fellowship and Nanotechnology Category Winner). He is the associate editor or board member of five international journals. He has supervised over 40 postgraduate students.

**Research Project / Interest**

- Strengthening and toughening mechanisms in natural and synthetic biomaterials (ARC Discovery Project)
- Fabrication of bio-inspired hierarchical structures for tissue engineering
- Nano carbon composites for biomedical applications
- Characterization of interfacial behaviour between protein and mineral
**Profile**

Prof. Brown is Chair in Biomedical Engineering, Director of the Medical Engineering Research Facility, and Head of the Phonics and Mechanics of Biomedical Materials Group. He is an Associate Honorary Professor at the University of Oxford.

Prof. Brown’s research examines the structure-property-function relationships in biological materials/systems such as spider silks, ivory, and musculoskeletal tissues, and in the synthetic materials used in medicine. His group specialises in nanomechanical, electromechanical, and nonlinear optical methods.

**Research Project / Interest**

- Surface-guided self-assembly of collagen for biosupercapacitors.
- Structure-property-function relationships in high-performance biomedical materials.
- Electromechanics and polarity in biological systems.
- Material-protein interaction profiles in health and disease.
- Ultrafast laser applications in regenerative medicine.
- Nonlinear optical characterisation of cells and tissues.
- Nanomechanics in cell-material interactions.
- Self-healing in spider silks.
Profile
Prof Li is a professor and ARC Future Fellow at QUT. He is also an Honorary Professor at UQ. He has made significant contributions to understanding the biomechanics of plaque rupture. The main focus of his work has been the development of a better risk stratification for stroke in order to improve current clinical practice in the management of patients with carotid stenosis. The work involves MRI, stress analysis, material testing and mechanical modelling. He was awarded a JRF of Wolfson College at University of Cambridge and then elected as a Fellow of the College. He has published extensively in high-quality journals including Nature Review Cardiology, Circulation, New England Journal of Medicine, JACC and Journal of Biomechanics etc.

Research Project / Interest

- Mechanobiology in atherosclerosis;
- Atherosclerosis-on-a-chip;
- Scaffold design for tissue engineering;
- Novel medical device design and research;
- Cell-material interactions
Profile

Prof. Prasad KDV Yarlagadda worked in industry and university over 30 years. He is distinguished graduate of IIT, Bombay brought considerable Bio manufacturing skills to Australia based on his prior experience in India, Hong Kong, Paua New Guinea and Singapore. He is currently Professor in Smart Systems and Project Director: Airports of the Future, in Queensland University of Technology, Australia. He is also a key researcher in Industry training and transformation centre for Bio Additive Manufacturing.

Prof. Yarlagadda had number of distinguished appointments in various universities in India, China and Australia. He received more than $16M funding for his research and he published 500 papers. In 2012 he received a Prestigious Great Honour Award for his outstanding and life time contribution to the discipline of manufacturing in world Arena from Materials Division of Polish Academy of Sciences. In 2016 Professor Yarlagadda was awarded Order of Australia Medal and included in Queens Birthday Honours list in recognition of his outstanding service to Engineering Profession and Indian Community in Queensland, Australia. He is Editor in Chief and Deputy Editor-in-chief of 4 international journals, and also editorial board member of 18 ISI listed Journals. He is fellow of many professional organisations of Indian communities of Queensland, President The India Australia society and others.

Research Projects / Interests

- Tissue Engineering and Tissue Scaffolding for Orthopaedic Applications
- Bio-Manufacturing and Bio-Fabrication
- 3-D Printing and Additive Manufacturing for Biomedical Applications
- Bio Mechanics and Vascular System Design
- Nano Technology Application for Bactericidal Surface Production
- Nano Bio-Technology Applications for Infection Free Hospitals
- Innovative Implant Manufacturing for Orthopaedic Applications
**Profile**
Prof Erik (Rik) Thompson joined IHBI QUT in 2014 as Professor in Breast Cancer Research and became Theme Leader for ‘Chronic Disease and Ageing’ until 2016, when he took up his current role of Associate Director of IHBI at the Translational Research Institute. He has a strong long-standing interest in epithelial mesenchymal plasticity (EMP) research and with NBCF support created the EMPathy Breast Cancer National Collaborative Research Program in 2008. Over the past decade Rik has also developed research interests in the pathobiology of mammographic density (MD) as a risk factor for breast cancer, with emphasis on hormonal regulation and extracellular matrix. Together with Prof Ken Ostrikov he is developing a research program into Plasma Therapy of Cancers.

**Research Project / Interest**
Plasma medicine appears to have selective killing of the so-called 'Triple Negative Breast Cancer' (TNBC) cells that lack the therapeutic receptors: estrogen receptor, progesterone receptor and HER2. The Plasma effects can be propagated using Plasma-Activated Medium (PAM) and we are looking to selectively target PAM to the breast cancer cells using targeted, bacterially-derived, PAM-loaded nanoparticles. These studies are collaborative with Prof Bernd Rehm from Griffith University.
Professor Mia Woodruff
Email: mia.woodruff@qut.edu.au
https://staff.qut.edu.au/staff/mia.woodruff

Profile
Prof Mia Woodruff leads the Biofabrication and Tissue Morphology Group. She attained her PhD in 2006 and has published over 70 papers and has been a CI on over $3 million in research grants. She is an expert in bone tissue engineering with extensive experience in all aspects of biomaterial scaffold fabrication techniques and pre-clinical models and has built a world-leading histology laboratory. She is the recipient of a QUT Vice Chancellor’s Research Fellowship and ARC APD Fellowship. Mia has recently been awarded the Women in Technology QLD Life Sciences Research Leader Award in 2018 as well as a QUT Vice Chancellor’s Award for Excellence. In 2017, Mia was awarded the Rose-Anne Kelso Commemorative Award for her “endeavours, passion and dedication to the health and life sciences industry”. Mia was also awarded second place (highly commended) in the WIT “Rising Star” award category in 2012 and nominated for the Biotech researcher award in 2013. She was also the winner of the Queensland Young Tall Poppy Science Award in 2013 and in 2014 was recognised in Qweekend’s 50 Best and Brightest.

Research Project / Interest
- Composite scaffolds for tissue engineering
- Electrospinning – melt and solution
- In vivo models for bone regeneration
- Cell culture and in vitro biocompatibility studies for new biomaterials
- Microsphere production for growth factor delivery
- Histology and μCT assessment of biomaterial implants
- Large animal models, large bone explants histology processing using PMMA resin embedding
Profile
Associate Professor Travis Klein heads the Cartilage Regeneration Laboratory (CRL) and the Injury Prevention and Trauma Management Theme at the Institute of Health and Biomedical Innovation. He is also the Biomedical Engineering and Medical Physics Discipline Leader in the School of Chemistry, Physics, and Mechanical Engineering, and the Deputy Director of the Australian Research Council Training Centre in Additive Bio manufacturing. Travis’ ultimate aim is to help develop long-term regenerative therapies for treating damaged joints. To help understand tissue formation and joint pathologies, and engineer functional tissues, his group is developing: model systems using human cells, functionalised biomaterials, Biofabrication approaches, and mechanical stimulation technologies.

Research Project / Interest
- Optimising mechanical loading protocols to enhance engineered tissues
- Cellular behaviour at the native-engineered tissue interface
- Behaviour of cells in advanced hydrogels
- Temporal control of material behaviour and tissue production
Profile
I completed a BSc (Genetics) and BEng (Chemical) at the University of Alberta in Canada. As an Engineering graduate I worked as a Project Manager for Exxon/Mobile developing heavy oil fields in Northern Alberta. Motivated by an interest in biomedical research, I relocated to Sydney, Australia and undertook a PhD in Biomedical Engineering at UNSW. I currently hold an NHMRC CDF-2 Fellowship titled “Bridging the fields of cartilage, bone marrow and cancer research”. I am an Associate Professor and Group Leader at the Translational Research Institute (TRI) on the Princess Alexandra Hospital campus. My laboratory is focused on linking engineering and biological principles to develop insight, and treatment strategies, relevant to (1) HSC transplant to treat haematological cancers and the application of gene therapy, (2) bone and cartilage stem cell-based tissue engineering strategies with the primary goal of repairing cartilage defects, and (3) the development of new in vitro and in vivo cancer models with the primary goal of improving prostate cancer treatments.

Research Project / Interest
- cartilage tissue engineering
- prostate and breast cancer
Profile
Associate Professor Larisa Haupt is a Principal Research Fellow and the Neurogenesis and Stem Cell Group Leader within the Genomics Research Centre at IHBI. A/Prof Haupt has extensive research expertise in the extracellular matrix, stem cells, cell and molecular biology and human molecular genetics. Her research team has a particular interest in the role of the extracellular matrix, with a focus on the proteoglycans, in the regulation and dysregulation of cell behaviour including lineage specification and cancer. A/Prof Haupt and her team utilise molecular and cell biological in two- and three-dimensional culture models as well as next generation sequencing platforms to unravel these complex mechanisms in humans. Models used for this work currently include: primary human mesenchymal stem cells (hMSC); human embryonic stem cell derived neural stem cells (hNSC H9 and ENStem-A); primary cortex derived normal human progenitor cells (nhNPC); human immortilised frontal cortex-derived cells (ReNcell CX); patient-derived Alzheimer’s Disease iPSC-NSCs (AD-iPSC-NSCs); human primary normal human mammary epithelial cells (HMECs); and human breast cancer (HBC) cell lines.

Research Project / Interest
- Human neural stem cell models, proteoglycans, stem cell microenvironment, lineage specification
Profile
Yi-Chin Toh is a Future Fellow and Associate Professor at the Queensland University of Technology. She obtained her B.Eng in Chemical Engineering and Ph.D in Bioengineering from the National University of Singapore in 2001 and 2008 respectively. She did her post-doctoral training at the Massachusetts Institute of Technology in 2008 under Professor Joel Voldman’s guidance. Before joining QUT, she led an independent research group as an Assistant Professor at the Department of Biomedical Engineering, National University of Singapore. Yi-Chin’s major scientific contribution is in the advancement of microfluidic tissue models for applications in drug testing and experimental biology. To date, she has published over 40 papers in leading scientific journals such as Biomaterials and Lab on a Chip. Her current research interest is in engineering multi-scale tissue models to mimic complex biological interactions during human development and diseases, as well as translating them into scalable platforms for disease modeling and drug testing applications. Her lab is also working on integrating microfluidics and biofabrication technologies to realise a new generation of human-on-chips. Dr Toh is a recipient of the Australia Research Council Future Fellowship, National University of Singapore Research Scholarship, A*STAR Graduate Scholarship and A*STAR International Fellowship.

Research Project / Interest
- Develop micro-physiological systems to model multi-organ crosstalk
- Metabolic tissues
- Host-microbiome interactions
- Develop phenomics screening platform for immune-tissue interactions in diseases and adverse drug reactions
- Integrated 3D printing for fabricating human-on-chip systems
Profile
Dr Tran’s research has evolved naturally from nano and biomaterial development and nanomedicine to scaffold design, tissue regeneration and has created strong impacts in the fields. It has resulted in 34 refereed journal articles, two book chapters, two patent applications, 14 conference papers; generated more than 800 citations and attracted more than $1.4 million in funding. He was invited to review manuscripts for journals such as Biomaterials, PLOS ONE and review international research grant applications. Dr Tran has also established a strong research network through collaborative, interdisciplinary projects with academics and clinicians. A number of his collaborations have resulted in diverse publications in leading journals such as Nanoscale, Advanced Drug Delivery Reviews, Journal of Materials Chemistry, Journal of Biomedical Materials Research Part A, Materials Science and Engineering C: Materials for Biological Applications, ACS Biomaterials Science & Engineering and Journal of Materials Science. As a young researcher, Dr. Tran has successfully led two externally-funded, interdisciplinary projects that focus on developing and translating local drug delivery technologies into medical applications in 2013-2014. In 2015 Dr Tran was awarded a prestigious Vice-Chancellor’s Research Fellowship at QUT to work with Prof. Dietmar Hutmacher – a world’s leader in the field of bioengineering, tissue engineering and regenerative medicine. Here he has integrated his expertise to recently developed and validated new scaffolding technology that allows for independent control of the bioactivity and the manufacturing of biodegradable polymeric scaffolds by 3D printing. At the end of 2015, he has secured external funding of $10,000 to apply this technology in dental tissue regeneration. In 2017, Dr Tran has been awarded $600,000 research funding for developing a novel antimicrobial surface treatment and drug eluting technology for orthopaedic implants.

Research Project / Interest

- Material and surface modifications for antimicrobial medical devices.
Profile
Dr Yinghong Zhou is an NHMRC Early Career Fellow within the Bone and Joint Disorders Program at the Institute of Health and Biomedical Innovation. Dr Zhou obtained her PhD in Medical Engineering from the Queensland University of Technology (QUT) in December 2013. Dr Zhou seeks to understand the mechanisms for bone repair and regeneration, with a particular interest in stem cell therapy and biomaterial application. Much of her past and current research work has utilised animal models to investigate the pathophysiology and treatment of bone-related diseases. She has recently been awarded a prestigious Endeavour Research Fellowship (2017) for a collaborative project on dissecting the role of DMP1 in cell transformation from chondrocytes to bone cells at Texas A&M University College of Dentistry. Dr Zhou was appointed as the Coordinator/Acting Deputy Director of the Australia–China Centre for Tissue Engineering and Regenerative Medicine (ACCTERM) in 2013 and has worked in the role since.

Research Project / Interest

- Smart materials for periodontal regeneration;
- Exosome-integrated biomaterials for bone regeneration;
- Osteocyte biomineralisation
- Angiogenesis
- Osteoimmunology
Dr Indira Prasadam
Email: i.prasadam@qut.edu.au
https://staff.qut.edu.au/staff/i.prasadam

Profile
Dr Indira Prasadam is an award-winning early career researcher at the Institute of Health and Biomedical Innovation, Queensland University of Technology. She leads national and international collaborations to develop cell and gene therapies and investigate disease mechanisms in the musculoskeletal diseases such as osteoarthritis (OA). She has published over 45 peer-reviewed articles in top tier journals, serves on a number of prestigious professional boards and ad-hoc reviewer for more than 8 top-ranking journals in the fields of rheumatology and for various granting bodies.

Research Project / Interest
My research program aims to advance the knowledge of OA pathophysiology by defining the biochemical and molecular mechanisms of joint pathology so as to develop effective therapeutic strategies. Specifically, my research address three critical questions that remain unanswered, namely, how OA cells become metabolically rewired, the role of diet and metabolic factors in OA progression, and how OA changes structurally in terms of osteochondral interface. My research team also uses tissue engineering approach to develop cell and advanced biomaterial-based strategies for the repair and regeneration of cartilage. My lab uses clinically relevant in vitro and in vivo models coupled with innovative high throughput metabolomics, state of the art molecular and cell biology approaches, and the appropriate clinical samples for translation. Key outcomes of my research program will deliver new knowledge that will result in the accumulation of highly translatable scientific knowledge in the OA field to provide the vital platform that develops novel treatments.

- define the specific energy requirements and metabolic mechanisms contributing to the onset and progression of OA
- define how metabolic and dietary factors (fatty acids and simple carbohydrate composition) effect joints and the joint immune system, and promotes the development of OA
- define the structural changes and mechanisms involved in OA using transgenic cell-lineage tracing models
- To develop/optimise cell delivery strategies that promote cartilage tissue maturation and integration within cartilage defects using tissue engineering strategies
Appendix 4 – Proposed ECUST Supervisors

Professor Changsheng Liu
Email: liuchangsheng@ecust.edu.cn

Profile
Prof. Changsheng Liu is the currently president of Shanghai University, and the leader of the Engineering Research Center for Biomedical Materials of Ministry of Education in East China University of Science and Technology (ECUST). He is the academician of Chinese Academy of Sciences, the Cheung Kong Scholar Professor of ECUST, and winner of the National Natural Science Foundation of China for Distinguished Young Scholars. In addition, he has been awarded the International Fellow of Biomaterials Science and Engineering and AIBME Fellow.

Professor Liu is a prestigious expert in the field of biomaterials science. He raised novel concept of materiobiology together with Professor Yin Xiao in QUT. His research has evolved in the fields of biomaterials, tissue regeneration, stem cell therapy, and clinical transformation. He has developed various biomaterials including calcium phosphate cement and growth factor-loaded artificial bone, which were approved by SFDA and used in more than 500 hospitals in China for over 20 years. He has published more than 220 journal articles, 60 patents, and 4 edited books. Owing to these distinguished work, he achieved the second-prize of National Natural Science Award and Science and Technology Progress Award.

Research Project / Interest

- Principle and designing criteria of bioactive materials for In situ tissue regeneration
- Interaction between biomaterials and host microenvironment
- Technologies for harvesting endogenous stem cells for tissue regeneration
- Clinical translation of regenerative materials
Profile
Prof. Yongsheng Li is a full professor in School of Materials Science and Engineering, East China University of Science and Technology (ECUST), Deputy Director of Key Laboratory for Ultrafine Materials of Ministry of Education, China, and Director of International Affairs Office, ECUST.

Professor Li’s work has mainly focused on the design and synthesis of biomaterials and the investigation on the component-structure-function relationships of the synthesized biomaterials/systems, such as block-copolymer based nanohybrids, novel mesostructured nanoparticles/scaffolds and MOFs-based nanohybrids for early detection, diagnosis and therapy of diseases, as well as bone repair and regeneration. He has published more than 180 papers in peer-reviewed journals and 3 invited book chapters, which have been cited widely for more than 7000 times. He is pioneered in the development and exploring of novel nanohybrids/hybrid scaffolds biomaterials.

Research Project / Interest
- Block copolymer based nanohybrids for cancer diagnosis and therapy
- MOFs-based nanomaterials for disease early detection
- Novel Mesostructured silicas for drug/gene delivery and imaging
- Hierarchically porous hybrid scaffolds for bone repair and regeneration
Professor Runhui Liu
Email: rliu@ecust.edu.cn
http://clxy.ecust.edu.cn/2015/0105/c4944a36548/page.htm

Profile
Prof. Liu is a Professor of biomaterials science at the East China University of Science and Technology. Prof. Liu’s research mimics some important biological functions of proteins/peptides using synthetic chemistry in combination with polymer science, microbiology, biology, and tissue engineering technologies. His lab recently established a water insensitive and superfast NCA polymerization method for quick synthesis of polypeptide library and high through-put screening on biological activities. His lab has developed host defense peptide mimicking polymers with potent and broad spectrum antimicrobial activities against multi-drug resistant bacteria and fungi. His lab has also developed synthetic mimics of ECM peptides for tissue engineering applications.

Research Project / Interest
- Developing new strategies for polymer synthesis.
- Designing and optimizing antimicrobial polymers.
- Developing cell-adhesive polymers for bone regeneration.
- Developing novel polymeric materials for wound healing.
**Profile**

Professor Yuan Yuan is a full professor and Master supervisor in East Chian University of Science and Technology (ECUST). She has received PhD degree in 2005 in materials from ECUST and she has done Postdoctoral Research Fellow in the Ohio State University in 2007/3-2008/9. She has received the Ministry of education of New Century Excellent Talent in 2011 and Leading talents in Shanghai in 2017.

Professor Yuan’s research interest mainly focuses on “Fabrication and evaluation of bioactive bone tissue scaffolds/hydrogel”. She has published more than 110 SCI papers and 18 authorized Chinese patents and 2 authorized USA patents. She won the Second-prize of National Award for Natural Science (China) in 2014 (the second rank) and the First-prize of Award for Natural Science (Shanghai) in 2013 (the second rank).

**Research Project / Interest**

- Hierarchical macro/nano-architectures bone tissue scaffold
- Novel injectable hydrogel for bone regeneration
- 3D printing bone tissue scaffold
- Age-related bone regeneration materials and mechanism
Profile
Professor Jing Wang is a full professor in School of Materials Science and Engineering, East China University of Science and Technology (ECUST). She obtained her PhD degree in Material Science from ECUST in 2007 and received the Ministry of education of New Century Excellent Talent in 2012. Her work has predominantly focused on the regenerative biomaterials and their biological effects for tissue regeneration and stem cell therapy. She has published more than 60 SCI papers and 12 authorized patents. She won the Second-prize of National Award for Natural Science (China) in 2014 (the forth rank) and the First-prize of Award for Natural Science (Shanghai) in 2013 (the fourth rank).

Research Project / Interest
- Angiogenic effects of biomaterials and vascularization mechanism
- Designing biomaterials for recruiting stem cells and its applications in stem cell therapy
- Bioactive materials for in situ tissue regeneration and aging-related musculoskeletal repairing
- Clinical translation of regenerative materials
**Profile**

Prof. Xue Qu received her bachelor degree from Zhengzhou University, and Ph.D. from Institute of Chemistry, Chinese Academy of Sciences in 2007. Then she worked as a JSPS postdoctor in Waseda University, Japan from 2007-2009. She joined East China University of Science and Technology since 2009 and was promoted to be a full professor in 2018. Her research focuses on assembly and functionalization of biomacromolecule including protein/polysaccharide/polyphenol. Some results were published on main current journals such as ACS nano, J. Am. Chem. Soc., Adv. Funct. Mater., Biomaterials. She was selected as a Shanghai Youth Science and Technology Talent Star in 2014 and won the National Outstanding Youth Fund in 2019.

**Research Project / Interest**

- Electrofabrication of biomacromolecules for medical applications.
- Multiple functional Hydrogel scaffold/glue/implants
- Polyphenol chemistry and biology
Profile
Dr. Chen is currently the professor of medical biomaterials engineering center of ministry of education, East China University of Science and Technology (ECUST), China. She has been devoted to the research and development of biomaterials, including the construction of hard tissue repair materials, active modification and self-assembly, the interaction between materials and organisms, hemostatic materials and their clinical applications.

As the project leader, she has taken more than a dozen projects including national key research and development program, national natural science program, national science and technology support program and Shanghai natural science foundation. She has published four invited book chapters and more than 50 journal papers. She won the second prize of the national natural science award in 2014 (the 3rd accomplisher) and the first prize of Shanghai natural science award in 2013 (the 3rd accomplisher).

Research Project / Interest
- Highly bioactive bone repair biomaterials for the osteoporosis defect repair
- Absorbable hemostatic materials
- Bionic design and functionalization of hard tissue materials
- Processing and application of biomass materials
Dr. Hongyan He is an associate professor of Engineering Research Center for Biomedical Materials of Ministry of Education at East China University of Science and Technology (ECUST). She served as a key research engineer in Nanoscale Science and Engineering Center for Affordable Nanoengineering of Polymer Biomedical Devices at Ohio State University from 2006-2008. Before joining ECUST in 2013, she worked as a Principle Scientist at BioLOC LLC. company in USA. She directed the research and development for designing and manufacturing of an automatic ELISA microfluidic chip by using micro/nano fabrication technologies, and interacted with cross-functional teams in order to drive the products into the marketplace. Currently, her research interest includes nanoscale phenomena at surface and interface of biomaterials, fabrication of low-cost biochip/biosensors, and drug/cell-based delivery systems by micro-/nanofabrication.

Research Project / Interest

- Surface electrospinning of bioactive molecules for implantable metals
- Surface-guided self-assembly of growth factors for artificial ligament
- Structure-property-function relationships in high-performance biomedical materials
- Design of low-cost biochip/biosensors
- Development of nano-drug delivery systems for oral administration
- Development of cell-based delivery systems for implantable applications
Profile
Professor Yulin Li is an Associate Professor at Engineering Research Center for Biomedical Materials of Ministry of Education, East China University of Science and Technology (ECUST), Shanghai, China. In 2009, he was appointed as a Research Assistant Professor at University of Madeira, Portugal. In 2014, he joined ECUST, where he together Prof. Changsheng Liu and Prof. Yin Xiao (QUT) brought up the new concept of “materiobiology”, aiming at optimizing the biological effects of biomaterials on biological functions at cell, tissue, organ, and the whole organism levels. He has published 1 edited book, and more than 60 journal papers. In the past five years, Prof. Li’s citation index (h-index: 18) has risen significantly with more than 1600 citations. Prof. Li’s work is involved in the exploration of bioactive materials for bone regeneration and drug delivery, especially focusing the clinical translation of regenerative medicine. He is also pioneered in the development of biodegradable and injectable hydrogels (nanogels) for biomedical applications.

Research Project / Interest
- Mass production of bioabsorbable materials and their clinical translational biomedical devices
- Development of bioactive injectable materials for tissue regeneration in situ
- Biodegradable carriers for drug delivery applications (skin, bone, cosmetics)
Profile
Dr Dechao Niu is the associate professor of School of Materials Science and Engineering, East China University of Science and Technology. He obtained his Ph.D degree (2012) from ECUST. He researches mainly focus on the design and synthesis of block copolymer- based multifunctional nano-composites and hierarchical mesoporous nanoparticles for biomedical applications. Dr. Niu has published over 40 papers, including Chem. Soc. Rev., Adv. Mater., J. Am. Chem. Soc., Adv. Funct. Mater., and so on. He was awarded the Program for Professor of Special Appointment (Eastern Scholar) at Shanghai Institutions of Higher Learning (2017), the Shanghai Rising-Star Program (2016), the Hong Kong Scholars Program (2013), the Chenguang Scholars Program of Shanghai (2014), etc.

Research Project / Interest
- various silica/organosilica stabilized block copolymer micelles and their biomedical applications in bio-imaging and cancer therapy
- multifunctional nanotheranostic system with improved bio-imaging capability and enhanced tumor therapy efficacy
- controlled drug delivery, bio-imaging (magnetic resonance) and imaging-guided therapies (photothermal and high intensity focused ultrasound therapies)
- block-copolymers self-assembly induced hierarchical mesoporous silica nanoparticles and bio-applications
Dr Qi Gan
Email: ganqi@ecust.edu.cn

Profile
Dr Gan is a lecturer in East China University of Science and Technology (ECUST). He received his Ph.D. degree from ECUST, China, in 2012 and worked as a Postdoctoral Research Fellow in the Hong Kong Polytechnic University in 2017/4-2019/4. Currently, he is a teacher of College of Materials Science and Engineering at ECUST.

His scientific interest focuses on Bioactive tissue regeneration materials and nanoscaled biomaterials. He has published more than 13 SCI papers, and 3 authorized Chinese patents.

Research Project / Interest
- 3D-printing bone repair scaffolds.
- high bioactivity bone repair scaffolds.
- environment-responsive drug/protein delivery systems
- cell behaviours regulated with nano-micro patterns